



# IBEX satellite finds ribbon-like structure at edge of heliosphere

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## ***Science paper to describe unexpected structural features shown by LANL camera***

The invisible structures of space are becoming less so, as scientists look out to the far edges of the solar wind bubble that separates our solar system from the interstellar cloud through which it flies. Using the High Energy Neutral Atom Imager, led by Los Alamos National Laboratory, the NASA Interstellar Boundary Explorer (IBEX) mission has sent back data that indicates a “noodle soup” of solar material has accumulated at the outer fringes of the heliosphere bubble.

As the solar wind streams out far beyond Pluto, racing a million miles per hour, it reaches the edge of our bubble and collides with the material between the stars, the interstellar medium. A shock wave forms at that intersection point. The Los Alamos camera is designed to detect the particles that are heated and stream away from that boundary, specifically the density and temperature of atoms that form the core of that layer. The High Energy Neutral Atom Imager instrument is particularly important because its design parameters are well matched to the temperature of most of the soup; about a million degrees centigrade (1.8 million degrees Fahrenheit).

One of the five IBEX papers appearing in *Science* this week, LANL’s lead contribution is “Structures and Spectral Variations of the Outer Heliosphere in IBEX Energetic Neutral Atom Maps.” In the paper, author Herbert Funsten notes “We have discovered an arc-shaped ribbon of high-pressure material that looks to be piled-up material from the Sun. The IBEX maps and the discovery of the ribbon are completely different from what we thought it should look like.”

“We were expecting tie-dye and instead found noodle soup,” Funsten said.

What the mission has not found is what they were expecting, that is, evidence of large-scale dynamic processes that might be analogous to storms and tornados from the collision of a cold front and a warm front. A striking result is that “our maps show structure and energy spectra that are completely different from what any model has predicted,” he noted.

“The ribbon follows a circular arc of high pressure that we believe is centered on the direction of the magnetic field of the interstellar cloud through which we are moving,” Funsten said. This magnetic field seems to fundamentally organize the interaction region.

The results of IBEX not only reveal fundamental properties of the heliosheath but also provide key information about the properties of the interstellar cloud through which our galaxy is moving. We will be moving out of the cloud in about 10,000 years; the IBEX results will help us understand how the Earth's space environment might be different when this happens.

IBEX is the latest in NASA's series of low-cost, rapidly developed Small Explorers space missions. Southwest Research Institute in San Antonio, Texas, leads and developed the mission with a team of national and international partners. NASA's Goddard Space Flight Center in Greenbelt, Maryland, manages the Explorers Program for NASA's Science Mission Directorate in Washington.

For IBEX, SwRI is partnering with Orbital Science Corporation, Los Alamos National Laboratory, University of California, Riverside, Lockheed Martin Advanced Technology Center, NASA Goddard Space Flight Center, the University of New Hampshire, the Applied Physics Laboratory and the University of Southern California. The team also includes a number of American and international scientists from universities and other institutions, as well as Chicago's Adler Planetarium, which is leading education and public outreach for the mission.

See more about IBEX online at [http://www.nasa.gov/mission\\_pages/ibex/index.html](http://www.nasa.gov/mission_pages/ibex/index.html). Copies of the embargoed Science paper may be distributed only by the AAAS Office of Public Programs, phone 202-326-6440 or email [scipak@aaas.org](mailto:scipak@aaas.org)

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